

**What is claimed is:**

- 1        1.    A method for frequency conversion in a receiver,  
2        comprising the steps of:  
3        receiving a signal having a radio frequency and  
4        carrying information on a plurality of channels;  
5        selecting one of the channels;  
6        converting the signal from the radio frequency to a  
7        first variable frequency determined by the  
8        selected channel; and  
9        converting the signal from the first frequency to a  
10       second frequency.
- 1       2.    The method as claimed in claim 1, wherein the  
2       first frequency is determined so that noise coupled from the  
3       other channels into the selected channel is minimized.
- 1       3.    The method as claimed in claim 1, wherein the  
2       first frequency is higher than the radio frequency.
- 1       4.    The method as claimed in claim 1, wherein the second  
2       frequency is fixed for all the channels.
- 1       5.    The method as claimed in claim 1, wherein the  
2       second frequency is a baseband frequency.
- 1       6.    The method as claimed in claim 1 further  
2       comprising the step of:  
3       converting the signal from the second frequency to a  
4       third frequency.

1           7.    The method as claimed in claim 6, wherein the  
2 first frequency is determined to minimize noise coupled from  
3 the other channels into the selected channel.

1           8.    The method as claimed in claim 6, wherein the  
2 first frequency is higher than the radio frequency.

1           9.    The method as claimed in claim 6, wherein the  
2 second frequency is fixed for all the channels.

1           10.   The method as claimed in claim 6, wherein the  
2 second frequency is lower than the first frequency.

1           11.   The method as claimed in claim 6, wherein the  
2 third frequency is fixed for all the channels.

1           12.   The method as claimed in claim 6, wherein the  
2 third frequency is a baseband frequency.

1           13.   A receiver comprising:  
2           an antenna receiving an RF signal carrying information  
3                on a plurality of channels;  
4           a first local oscillator generating a first oscillating  
5                signal having a first frequency;  
6           a first mixer mixing the RF signal with the first  
7                oscillating signal to generate an intermediate  
8                signal;  
9           a second local oscillator generating a second  
10               oscillating signal having a second frequency; and  
11           a second mixer mixing the intermediate signal with the  
12               second oscillating signal to generate a baseband  
13               signal;

14            wherein a frequency of the intermediate signal is  
15            variable and determined by the selected channel.

1            14. The receiver as claimed in claim 13, wherein the  
2 frequency of the intermediate signal is determined so that  
3 noise coupled from the other channels into the selected  
4 channel is minimized.

1            15. The receiver as claimed in claim 13, wherein the  
2 first oscillator comprises:  
3            a first frequency divider dividing a frequency FR of a  
4            reference signal by a divisor N;  
5            a phase frequency detector having a first input coupled  
6            to an output of the first frequency divider;  
7            a charge pump having an input coupled to an output of  
8            the phase frequency detector;  
9            a loop filter having an input coupled to an output of  
10           the charge pump;  
11           a voltage controlled oscillator having an input coupled  
12           to an output of the loop filter;  
13           a second frequency divider dividing a frequency of a  
14           signal output from the voltage controlled  
15           oscillator by a divisor P and outputting the  
16           first oscillating signal; and  
17           a frequency multiplier multiplying the first  
18           oscillating signal by a multiplier M and  
19           having an output coupled to a second input of the  
20           phase frequency detector.

1        16. The receiver as claimed in claim 15, wherein the  
2        divisors N and P, and the multiplier M are determined by  
3        the selected channel.

1        17. The receiver as claimed in claim 13 further  
2        comprising a low noise amplifier coupled between the antenna  
3        and the first mixer to amplify the RF signal.

1        18. The receiver as claimed in claim 13 further  
2        comprises a SAW driver coupled to an output of the second  
3        mixer.

1        19. The receiver as claimed in claim 13, wherein the  
2        first and second mixers are image rejection mixers.

1        20. A receiver comprising:  
2        an antenna receiving an RF signal carrying information  
3        in a plurality of channels;  
4        a first local oscillator generating a first oscillating  
5        signal having a first frequency;  
6        a first mixer mixing the RF signal with the first  
7        oscillating signal to generate a first  
8        intermediate signal;  
9        a second local oscillator generating a second  
10        oscillating signal having a second frequency;  
11        a second mixer mixing the first intermediate signal  
12        with the second oscillating signal to generate a  
13        second intermediate signal;  
14        a third local oscillator generating a third oscillating  
15        signal having a third frequency; and

16       a third mixer mixing the second intermediate signal  
17               with the third oscillating signal to generate a  
18               baseband signal;  
19       wherein a frequency of the first intermediate signal is  
20               variable and determined by the selected channel.

1       21. The receiver as claimed in claim 20, wherein the  
2       frequency of the first intermediate signal is determined so  
3       that noise coupled from the other channels into the selected  
4       channel is minimized.

1       22. The receiver as claimed in claim 20, wherein each  
2       of the first and second oscillator comprises:  
3       a first frequency divider dividing a frequency FR of a  
4               reference signal by a divisor N;  
5       a phase frequency detector having a first input coupled  
6               to an output of the first frequency divider;  
7       a charge pump having an input coupled to an output of  
8               the phase frequency detector;  
9       a loop filter having an input coupled to an output of  
10              the charge pump;  
11       a voltage controlled oscillator having an input coupled  
12              to an output of the loop filter;  
13       a second frequency divider dividing a frequency of a  
14              signal output from the voltage controlled  
15              oscillator by a divisor P and outputting the  
16              first oscillating signal; and  
17       a frequency multiplier multiplying the first  
18              oscillating signal by a multiplier M and

19                   having an output coupled to a second input of the  
20                   phase frequency detector.

1           23. The receiver as claimed in claim 22, wherein the  
2           divisors N and P, and the multiplier M are determined by  
3           the selected channel.

1           24. The receiver as claimed in claim 20 further  
2           comprising a low noise amplifier coupled between the antenna  
3           and the first mixer to amplify the RF signal.

1           25. The receiver as claimed in claim 20 further  
2           comprises a SAW driver coupled to an output of the third  
3           mixer.

1           26. The receiver as claimed in claim 20, wherein the  
2           first, second and third mixers are image rejection mixers.